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Briefing Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce
House of Representatives

August 1986

INVENTORY CONTROLS

Improper Air Force Disposal and Reuse of F100 Engine Blades

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GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

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August 15, 1986

The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In response to your May 1986 request, we are currently reviewing actions taken by the Air Force to prevent the premature disposal of spare parts and other materials needed to support active weapon systems. In a July 9, 1986, meeting with your Office, we were requested to provide an interim report on our findings concerning the disposal and reuse of F100 engine blades by the Air Logistics Center (ALC), San Antonio, Texas. We found:

-- Engine blades were being improperly condemned and sent to the disposal yard to be sold as scrap metal.

-- Some condemned blades had been taken from the disposal yard, and after contractor repair, reintroduced into the maintenance system.

-- Air Force officials have found that many repaired blades are defective and have said that some defects are potential safety problems.

We discussed the potential safety problems with local Air Force officials who immediately began to take corrective actions. Our findings and the corrective actions are described more fully in the appendix. These findings were presented during our testimony before the Subcommittee on August 8, 1986.

We believe that failures in the Air Force's blade inspection and condemnation management control systems have resulted in these conditions. Accordingly, our continuing work will focus on these systems, with emphasis on internal inspection and condemnation controls. We will also continue to monitor Air Force actions to correct the F100 engine blade problems discussed in this report.

As agreed with your Office, we are also sending copies of this report to the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and House and Senate Committees on Appropriations and Armed Services; the Secretaries of Defense, Army, Navy, and Air Force; and the Directors of the Office of Management and Budget and the Defense Logistics Agency. Copies will be made available to others upon request.

If you have any questions, please call Robert Eurich, Group Director, at 275-8415.

Sincerely yours,

Frank C. Conahan

Frank C. Conahan
Assistant Comptroller General
of the United States

REVIEW OF AIR FORCE'S MATERIAL RETENTION AND DISPOSAL PRACTICES

In response to the Air Force Inspector General's findings that usable property was erroneously being sent to disposal, causing a significant waste of operation and maintenance funds, the Air Force imposed a disposal moratorium in March 1984.

In November 1985, the Secretary of the Air Force reported in the annual Financial Integrity Act compliance statement to the Secretary of Defense that all corrective actions to stop the premature disposal of usable property would be complete by the lifting of the moratorium. The Air Force moratorium was lifted on January 1, 1986.

THE AIR FORCE'S INSPECTION/CONDEMNATION PROCESS FOR F100 ENGINE BLADES

The F100 engine program is one of the Air Force's largest and most critical. The engine supports the F-15 and F-16 fighter aircraft and is essential to the combat readiness of the United States and several foreign governments. The Air Force has more than 2,900 F100 engines valued at more than $9.3 billion. The F100 engine is composed of six modules, including the high pressure turbine. Within the high pressure turbine are 68 first stage and 72 second stage blades. These blades are inspected during periodic turbine overhaul at the San Antonio ALC. As part of the process, turbines are evaluated for signs of over temperature operations, a condition which requires that all blades within the high pressure turbine be condemned. This is because blades that have been exposed to very high temperatures are more likely to fail and because such blades cannot be visually confirmed. Condemned blades are sent to the Defense Reutilization and Marketing Office (DRMO), where they are later sold as scrap metal.

If an over temperature condition does not exist, blades are removed from the turbine and those with obvious defects are condemned and sent to disposal. Blades that appear either serviceable or repairable are then subjected to a series of tests. Those that pass all the tests undergo limited Air Force rework and are returned to the assembly line as serviceable. Blades found to be damaged but repairable are held for contractor repair. If the damage requires further engineering evaluation, the blades are held until an Air Force engineering inspection team determines whether they should be condemned or held for future repair.

IMPROPER CONDEMNATION OF F100
ENGINE TURBINE BLADES CONTINUES

We began our review of post moratorium disposal practices in April 1986 at the San Antonio ALC. Shortly thereafter, we found that high cost F100 engine turbine blades in both serviceable and repairable condition, were still being improperly condemned by the Air Force and sent to DRMO where they are later sold as scrap metal.

According to DRMO records and information provided by the ALC, the improper and/or premature disposal of F100 engine turbine has been a problem since 1983 and has occurred before, during, and after the disposal moratorium.

In early April 1986, we visited DRMO and observed a repair contractor employee sifting through turbine blades in the scrap metal area. The employee identified 1,259 blades that were considered repairable and 13 that were considered serviceable. The total value of these blades was about $580,000. The contractor picked up the repairable blades the following week. ALC maintenance officials told us they did not verify the condition of the blades.

Because of the potentially serious consequences of properly condemned blades being used in overhauls, we asked the ALC to test the 13 serviceable blades identified by the contractor. Only seven of the blades were found to be serviceable. The other six blades were determined to be not repairable and, according to the Deputy Chief of Repair Technology, had been properly condemned.

In early July 1986, ALC officials said that they had also inspected 301 first stage blades that had gone to disposal after we had discovered the usable blades in DRMO. They found that 258 of these blades, with a value of over $155,000, had been improperly condemned. Of these blades, 168 were the newer design and more expensive "showerhead" blade. ALC officials told us they are developing a repair procedure for the newer blades and the blades should have been held in stock pending the award of a repair contract. The other 90 older design blades were found to be in repairable condition.

According to the Deputy Chief of the Propulsion Division, the repeated disposal of repairable blades is the result of confusing technical data, unclear inspection guidelines, and poor inspections made by Air Force maintenance personnel.

PREVIOUSLY CONDEMNED BLADES WERE BEING REPAIRED AND REINTRODUCED INTO THE SUPPLY SYSTEM

We were told the contractor employee had screened blades in disposal on four separate occasions during the last year. In a letter of appreciation to DRMO, dated February 18, 1986, the contractor stated that 3,835 blades had been recovered from scrap metal bins for repair and reuse by the Air Force. According to an ALC official, the contractor had typically requested and was given permission to screen blades in disposal when there was an inadequate supply of repairable blades; thus adversely affecting repair operations.

The ALC official also told us that the premature disposal problem was identified as early as 1983, when over 50,000 blades were recovered from the disposal yard. About 30,000 of these blades were eventually repaired.

In an attempt to determine more precisely the number of blades removed from the disposal yard, we examined DRMO records covering the period between February 1984 and April 1986. We found that over 28,000 blades, worth about $13.6 million, had been recalled from disposal and either shipped directly to the contractor for repair or to ALC.

SOME REPAIRED BLADES ARE DEFECTIVE

Because of the high failure rate of the 13 blades the contractor had considered serviceable, we asked ALC to inspect 142 blades repaired by the contractor. These blades were not in storerooms; they were located in the engine repair facility and, according to a maintenance official, they were ready to be used in engine overhauls.

Of the 142 blades inspected, 12 were rejected; 11 because of "thin walls" and 1 because of an "unacceptable heat code." These types of problems are related to manufacturing defects and can cause in-flight, catastrophic engine failure. According to ALC officials, these types of deficiencies should normally be identified when the blades are first removed from the engines and inspected. The Air Force should then condemn unacceptable heat code blades and send thin walled blades back to the original manufacturer for warranty exchange, in accordance with applicable technical orders and other management controls.

On July 2, 1986, the Director of Maintenance gave us a revised inspection report, stating that their previous inspection was incomplete. Later inspections identified 1 additional thin wall blade and 31 blades with "improper coating," bringing the total number of defective blades to 44.

Because of the problems which were identified in the blade tests and inspections we requested, the ALC has begun to inspect all blades that have been repaired and are still in serviceable depot stocks for use in engine overhauls. On July 1, 1986, ALC officials briefed us on their tentative findings. The ALC had inspected 1,000 first stage blades and found 47 to be defective. A total of 893 second stage blades were also inspected and 279 (31%) were found to be defective. ALC officials advised us that 10 of the defects identified in the second stage blades would present a potential safety problem if installed and at least 4 of the 10 blades had a thin wall problem that could lead to catastrophic engine failure. Another 71 blades should have been returned to the manufacturer for replacement under warranty.

ALC officials have continued to reinspect these second stage blades and have reported various inspection results to us. The actual numbers of blades examined and the numbers of blades not meeting current technical standards have continually changed. With each reinspection, the number of defective blades has decreased. Air Force officials also stated that visual inspections by maintenance personnel during final turbine reassembly will catch most of the defective blades, thus precluding their installation in F100 engines.

ALC officials could not tell how many defective blades had been removed from scrap metal piles, returned to serviceable stocks, and/or used in the repair of F100 engines or engine modules at ALC or at bases around the world. ALC officials also do not know if defective blades were sent to the repair contractor directly from maintenance or if they were removed from the scrap yard by the contractor after having been properly condemned by Air Force maintenance personnel.

AIR FORCE OFFICIALS HAVE TAKEN CORRECTIVE ACTIONS

We kept local ALC officials informed of our findings on this matter as they developed and briefed Department of Defense and Air Force officials at the Pentagon. The Air Force has taken a number of actions to prevent defective blades from being installed in engines and to correct underlying management control problems. Some of the major actions include:

-- ALC began inspecting all stocks on hand of both first and second stage F100 engine blades repaired by the contractor.

-- ALC is currently recalling uninstalled F100 first and second stage blades from field locations, worldwide, for reinspection.

-- ALC is developing guidelines for maintenance workers to help ensure that only properly condemned blades are sent to disposal. To prevent properly condemned blades from reentering the supply system, they have instructed that all condemned blades be mutilated before being sent to disposal.

-- Efforts are underway to obtain a complete accounting for all F100 blades received by the repair contractor.

OTHER, POTENTIALLY SERIOUS INTERNAL CONTROL PROBLEMS MAY ALSO EXIST

In addition to the blade problems discussed above, we found that other usable and needed F100 engine parts may have been prematurely condemned and sent to disposal. For example, an ALC official told us that while researching the blade problem, another major engine component, F100 engine vanes, may also have been improperly condemned. According to Air Force records, repairable vanes were found in the disposal yard as early as December 1984.

In addition, we have obtained evidence that parts for other aircraft engines have been prematurely sent to DRMO and later recalled from disposal. We obtained a list from ALC of 25 different engine parts that were removed from the disposal yard in 1985 by ALC.

We will continue to work with Air Force officials to determine the underlying causes for the conditions discussed above and to make an independent judgment on whether the control weaknesses, with respect to the F100 engine blades, are systemic to other types of maintenance operations as well.

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